Market Study Proposal

Predictive Maintenance in Motor Driven Systems - 2020

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Background to Our Research

Maintenance of motor driven systems is undertaken daily, around the world, within plants, equipment and machinery. This need is served by thousands of small, medium and large companies who help their clients repair, replace and maintain critical motor equipment to minimize disruption to productivity. In addition, many large plants and manufacturing companies retain on-site maintenance departments whose job it is to keep equipment running. The collective market value for these services is undoubtedly in excess of several billions of dollars; it may even dwarf the core equipment markets that it services.

The methods for maintaining motor and related equipment, such as induction motors, gearboxes, mounted bearing blocks and bearings, are mature and have been commonplace for many years. In reality, the status quo is inadequate. The vast majority of motor systems are not monitored, and those that are, largely rely on manual inspections and measurements, conducted periodically but rarely often enough. The net effect is a reactive marketplace; one that fixes post failure or performs emergency maintenance. The maintenance supply chain is not incentivized to minimize this disruption, and so the cost to industry is massive. Instances of downtime can cost millions of dollars of lost productivity, which could have been prevented by anticipated repair or service of deteriorating assets.

Change is Afoot

There have been recent and notable changes in various technology markets that have provided a new impetus to rethink the way maintenance could be performed, and their impact on the motor driven system maintenance market in the years ahead will be dramatic. Improvements in the price-performance ratio of sensing technology, such as MEMS devices, is driving the cost of sensing to a level where placing devices widely throughout plants is becoming viable. Additionally, the infrastructure required to take advantage of mass data derived from a large sensor base has evolved remarkably in recent years thanks to continued advances in compute technology, analytical tools and networking capability.

However, this is not a one size fits all problem. Different components within a motor driven system will be impacted in different ways. Some extensively; others perhaps minimally. Understanding how the different pieces of the market fit together, where technology is applicable and where it is not, and which areas will be most disrupted is a complex topic.

This research is being produced at a time when the industry is in an early and transformational stage. It will quantify key aspects of the motor driven system market, as well as forecast where disruption will take place and which company types will be most affected. The topic of “predictive maintenance” is a very broad one. By focusing on the motor-driven segment of the market, we hope to be able to provide targeted insight that is both useful and actionable, as opposed to overly generic and broad in nature. In truth, the scope of this research is still very broad, so the authors will draw on numerous research techniques to provide context from multiple angles, helping to place important trends in larger context.
The report will aim to analyze how predictive maintenance is being deployed and utilized in motor driven systems, and how this will evolve in the future. We include within the scope of the research:

- All low voltage (<690V) motors (including geared motors) used in industrial applications that are AC induction, high-efficiency permanent magnet types. (Note: servo, stepper, brushless DC and brush DC motors excluded.)
- Variable speed drives used to control these types of motors.
- Mounted bearing blocks used in motor driven systems.
- Any additional hardware that is deployed to facilitate device measurement, and any additive software that is deployed to perform the analytics.
- Service-based contracts that are designed to support predictive maintenance strategies.

In understanding the impact of “predictive maintenance”, we will also be analyzing the extent to which other maintenance strategies are being deployed including corrective, preventative and condition-based types, and clearly delineating between them.

The research will include market sizes and forecasts, estimates of the installed base of equipment along with penetration rates for various maintenance strategies, overview of key vendors and key products, and qualitative analysis highlighting key market and technological trends.

The primary research author, Adrian Lloyd, is one of the most experienced market analysts in the field of motors and drives, having pioneered research techniques and market models that have been used by just about every major vendor to the market over the last 20 years.
Report Scope and Market Segmentations

Primary Product Analysis

- Smart sensors
- Dedicated gateways*
- Portable measurement devices
- Traditional sensors
- Dedicated software*
- Dedicated services*

* "Dedicated" means expressly designed for predictive maintenance in motor driven systems. General purpose solutions are excluded from the research scope.

Further Product Segmentations

Smart sensors
- By sensor type (vibration, sound, temperature, magnetic field, pressure)
- By sensor technology (piezo vs. MEMS)
- By communication method (Ethernet, Wi-Fi, Bluetooth, other)

Traditional sensors
- By sensor type (vibration, sound, temperature, magnetic field, pressure)

Dedicated software
- Delivery model: Free vs. Paid-for
- Degree of sophistication (monitoring vs. predictive)
- Vendor type (sensor, drives, motor, mechanical, other)

Dedicated services
- By delivery model (categories TBD)

Installed Base Analysis

The “installed base” represents the entire population of products in use within industry at a given point in time.

We will build an installed base model for each of the following products for 2018 to 2023:

- LV motors
- Fans
- Pumps
- Compressors
- Bearing blocks
- Geared units

The purpose of this analysis is to determine how large the potential market is for sensors, and to help create credible forecasts by understanding the scale of opportunity versus rate of uptake.

We will include within the model estimated and forecast attachment rates for traditional and smart sensors. The installed base model will not include software or service based components.

The models will be constructed from third party statistics on a “best effort basis”.

Data will be presented in terms of USD revenues and unit shipments for the period 2018 to 2023

The research will provide detailed information for the segmentations listed above. However the scope may change based on feedback from clients, therefore additional content may also be provided within the final report.
Example Qualitative Output

In addition to the statistical data that will be presented, a key aspect of the report will be a clearly outlined overview of key trends and factors that are influencing the market development. We will cover a variety of topics within the report. The following sample pages were extracted from our recently published low voltage drives report and highlight our approach to presenting this type of information.

Vendor Analysis

We will also include information describing the supplier base such as:

- Profiles for start-up companies: size, investment status, product overview, etc.
- Detailed product matrices describing different offerings with links.
- A discussion of product capability & strategy for established vendors.
- A focus on what drive vendors are doing and how this will affect the market.

The Role of Motor Drives

Ultimately, the role of motor drives in an industrial digitization hierarchy is to offer up data.

1. It is important to recognize that in this role there is limited scope to influence the customer’s choice, whether machine builder or end-user. An industrial digitization platform provider’s users will not choose a platform and/or provider based on the drives they are using, but their choice would affect their device preference (e.g., compatibility would potentially influence the choice of drive).
2. The motor drive is in a position to mine useful data about the state of the motor, as well as serving its own operational status. However, it is unclear whether, in the longer-term, this motor drive will be the last measurement device for motor performance. This is because we are increasingly seeing dedicated sensing devices (e.g., Siemens’ SINEC IQ) ADI – Ability Smart Sensor) being sold either as part of the motor, or as a separate add-on device that attaches to the motor frame, which provides detailed measurements of the motor status. At this time, we do not know whether a device attached to the motor will be more effective than a motor drive in this role, and it may be that a combination of the two is an optimum solution.
3. For a motor drive to be effective as a data gateway/communicator, it must support communication standards that enable this. Even prior to the advent of initiatives such as Industry 4.0, HART, and OPC-UA, the trend towards Ethernet-based standards at the expense of fieldbuses today. Ethernet variants, notably PROFINET, Ethernet/IP, and EtherCAT, are the fastest growing networks and have healthy shares of the market. The lack of industrial digitization platforms being built around Ethernet variants, and thus supporting this type of connectivity will be necessary.
4. The adoption of motor-related software and services, notably status monitoring and predictive maintenance, will be strongly tied to the overall industrial digitization architecture being adopted by the machine builder and/or user. Not being one of the “dominant five” vendors poses companies at a competitive disadvantage.

- Many of the other drive vendors base their own control architectures and are building their own industrial digitization solutions around these. Companies such as Telemecanique, Delta Electronics, Westinghouse, Eaton, and Siemens have hired individuals with this expertise and are adopting industry standards and third-party tools. Vendors that do not have a control architecture to provide a total industrial digitization solution will likely have difficulties attracting or being able to attract new customers who are using these platforms, as they will have to compete against platforms specific tools that are integrated into the customers’ existing industrial digitization ecosystem.

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Statistical Methodology

The broad nature of this topic makes the production of market statistics particularly challenging. The market comprises two main components that need to be analyzed to construct a useful understanding of the overall market dynamics. On one hand we have a highly mature and established portion of the market that comprises a large array of electrical and mechanical service companies, vendors of various components of motor driven systems (motors, drives, bearings, etc.) and traditional sensor vendors. On the other hand we have the new and fast emerging aspect of the market that is providing new technologies (smart sensors, analytical software, etc.), which have the potential to disrupt the status quo.

When one looks at the large number of vendors active in the space, it becomes quickly apparent that a traditional “bottom-up” method, involving interviewing the majority of major vendors in the space to derive an aggregate market size estimate, is not going to work. The diversity and quantity of vendors that would need targeting makes this impractical. So how will we approach this?

The goal is to place everything in context, and to use this information to evaluate the speed and potential uptake of new technologies at the expense of old. Within the forecast period of this report (2018 to 2023) we will not see new predictive maintenance technologies adopted across the board. In all likelihood, it may only account for less than 10% of its total market potential during this timeframe. However, understanding the scale of the existing market and where predictive maintenance is most disruptive, will help us build a forecast that is meaningful.

Our approach will be to use a mixture of different sources and techniques to arrive at forecasts that are “directional” and “indicative”. Activities the researchers will undertake will include:

- Interviews with major vendors in each of the main motor driven product categories: motor companies, geared product companies, drives companies, bearing block companies, bearing companies, sensor companies, and smart sensor companies. We will aim to conduct around 40 in-depth discussions in total.
- We will use various third party statistics in the public domain that we believe are plausible to help us construct market size and installed base models. We have extensive in-house data collected from our Manufacturing Industry Output (MIO) tracker that can be used to support external data. We will also draw on the opinions of the individuals interviewed to help us answer difficult questions such as “what percentage of motors do you believe are currently being monitored”. We will utilize the “wisdom of crowds” concept to help us arrive at numbers that we believe are close to actuality.
- We will share our initial estimates with early-purchasers of the research for feedback and sanity checking.
- We will clearly document our assumptions, and explain how numbers were derived so our clients can gauge their overall quality.

Ultimately, it is important for our clients to realize that the statistical component is only one part of the overall study, and the data will have a higher degree of statistical tolerance versus what we typically generate.

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Report Pricing, Deliverables & Timescales

Report Pricing

- **Price reductions** are available, depending on when you choose to purchase the report. The earlier you purchase, the lower the cost.
- **Companies participating in the research phase** will receive a free summary of the report.
- This includes a **divisional licence** allowing the report to be shared across unlimited colleagues at any sites within a single company division.
- For special **corporate licence** pricing (allowing the report to be shared across multiple company divisions), please contact one of the report analysts.
- Interact Analysis also produces a wide range of Industrial Automation related market research. Please contact us for more information on this.

### Deliverables

- **PPT and Excel Deliverables**
- Issued via email and downloadable from the client area of our website

### Timescales

- Delivery of the final report will be in **April 2020**
- Preliminary data and analysis will be sent to pre-purchasers prior to final publication

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Who we are

Interact Analysis provides industry-leading market intelligence to the Intelligent Automation sector. Our team of vastly experienced analysts enable us to provide the highest quality data and expert analysis.

We offer a number of market intelligence services based on primary research. Our industry expertise combined with vast experience in statistical analysis provides you with reliable, trusted intelligence that enables you to make decisions with confidence.
What makes us different?

Experience – all of our team are experienced market research professionals, averaging 15 years in market intelligence.

Subject Matter Expertise – we have deep knowledge and understanding of the industries we cover.

Global Coverage – all research conducted globally. We have offices in the US, UK and China.

Focus on primary research – we believe that the best insight and analysis comes from real primary research and data and not desk research.

Data, Insights and Analysis – not only do we provide industry data, but expert insights and analysis.

Interaction – we believe in frequent analyst-client interaction and also enabling deep interaction with our data and analysis.
Analyst Biographies

Adrian Lloyd
• CEO & Research Director for industrial automation
• Adrian has been actively involved in technology market intelligence for more than 20 years. As part of the leadership team at IMS Research, a highly renowned information provider acquired by IHS Markit Inc. in 2012, Adrian has led research practices on a wide range of topics from industrial automation to semiconductors.
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• Jan has more than 10 years of experience in industrial automation and manufacturing research. Most recently, she was the Associate Director of the Manufacturing Technology research practice at IHS Markit. Jan led a global team of more than 10 research analysts that analyzed manufacturing markets with a particular focus on industrial automation equipment, machinery, industrial robots & service robots, and smart manufacturing trends.
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Tim Dawson
• Research Director for industrial automation
• Tim has over 15 years’ experience in technology market intelligence, of which he spent over 10 years at IMS Research as Research Director for its industrial automation and manufacturing technology teams. Before its acquisition by IHS Markit, IMS Research was the market leader in industrial automation research under Tim’s leadership. Post-acquisition, Tim continued his role as Research Director of manufacturing technology. Here he led a team of more than 35 analysts covering technology and industry developments for almost all the industries’ largest vendors.
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